

Diethylaminoethyl-Dextran (DEAE-Dextran)

General

Diethylaminoethyl-Dextran (DEAE-Dextran) is a polycationic derivative of Dextran. It is a white, hygroscopic powder, freely soluble in water and salt solutions and is supplied as the hydrochloride. Its high purity and controlled microbiological quality commend it for many applications in molecular biology and the health-care sector.

Chemical characteristics

DEAE-Dextran is prepared by reacting diethylaminoethyl chloride with dextran. The degree of substitution corresponds to approximately one DEAE-substituent per three glucose units (Figure 1). The mean molecular weight of DEAE-Dextran is approximately one million.

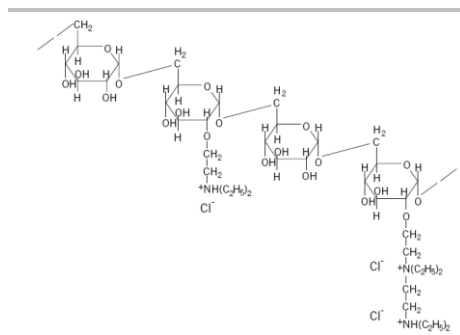


Fig 1. Structure of DEAE-Dextran

Table 1. Chemical characteristics of DEAE-Dextran

Mean molecular weight:	> 500 kDa
Nitrogen content:	3.0 – 3.5 %
Residue on ignition:	max. 1 %
Loss on drying:	max. 7 %
pH:	4.0 – 6.0
Absorbance:	max. 0.1
Free DEAE-chloride:	max 10 ppm
Heavy metals:	max. 5 ppm
Microbial contamination:	max. 100 m.o./g

Stability and storage

DEAE-Dextran is stable in solution at ambient temperature in the pH range 4–10. At acidic pH and at elevated temperatures, some depolymerization of the Dextran chain may occur. The dry powder shows excellent stability.

Controlled stability studies show that the powder is stable for more than three years when stored in air-tight packages at room temperature.

Sterilization

DEAE-Dextran can be autoclaved at pH 5–6. Some discoloration may be expected. Solutions of DEAE-Dextran can also be sterilized by sterile filtration.

Applications

Adjuvant in vaccines

Numerous reports attest to the effect of DEAE-Dextran as an adjuvant in production of veterinary vaccines. The following examples may be cited:

- DEAE-Dextran in pseudo-rabies vaccine in piglets (1)
- DEAE-Dextran in somatotropin release inhibiting factor in lambs (2)
- DEAE-Dextran effective adjuvant for cholera vaccine in mice (3)

Agent for reduction of cholesterol count

Numerous reports have shown that DEAE-Dextran lowers serum cholesterol and triglycerides by 8 and 14 percent respectively (4).

Enhancer of viral infectivity

One of the outstanding effects of DEAE-Dextran is its ability to enhance viral infectivity in cell cultures (5). The propagation of human rotavirus was drastically improved when the medium was supplemented with 30 µg/mL DEAE-Dextran.

Agent for transfection

DEAE-Dextran enhances the uptake of protein and nucleic acid by cells. Optimal concentrations would appear to lie in the range 100–300 µg/mL (6,7). Detailed protocols for transfection techniques have been published (8,9). DEAE-Dextran allowed superior transfection compared to other techniques in the transfer of DNA to human macrophages (10).

Stabilisation of proteins

Vacuum-dried enzymes and enzymes in solution can be effectively stabilized by DEAE-Dextran together with a low molecular weight polyalcohol. For example, the activity of glycerol kinase is preserved when vacuum-dried in the presence of DEAE-Dextran and lactitol (11)

References

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